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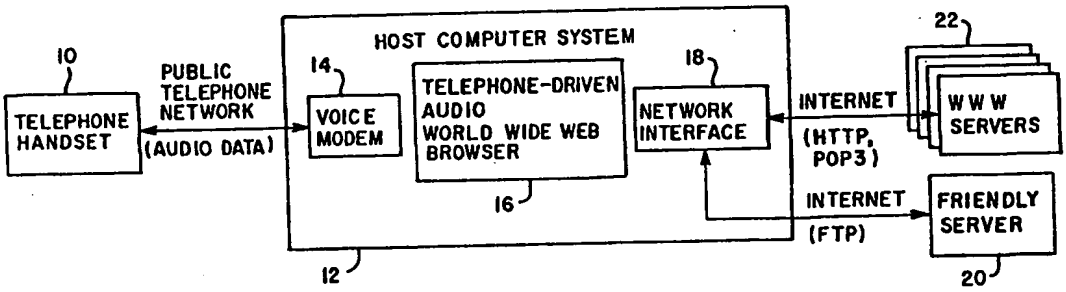

(57) Abstract

Access to the world wide web is achieved by using a traditional telephone to contact a host computer which has a voice-capable modem, a telephone-driven audio WWW browser (TAWB) and a connection to the Internet. The TAWB comprises a telephony interface, a digital voice processing module (DVP), an interchange between the telephony interface and the DVP, an audio document renderer, a command and control module, and an Internet interface. Additionally, the system contains a friendly server for storing information. The system relies on the presence of the WWW which can be described as a collection of WWW servers connected to the Internet.

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A System For Browsing The World Wide Web With A Traditional Telephone

Background of the Invention

Field of the Invention

The present invention relates to interfacing with the world wide web and more particularly to browsing the world wide web using a telephone.

Description of the Prior Art

The World Wide Web (WWW) is rapidly becoming the single most important source of information for businesses and consumers. As individuals rely increasingly on the information available on the WWW, they will require ubiquitous access to this information. One device that is readily available in almost any environment is the telephone; thus, it seems natural to consider the telephone as a WWW access device.

Traditional WWW browsers, such as Netscape's Navigator and Microsoft's Internet Explorer, offer complex visual renditions of WWW documents. These are not suitable for telephones because telephones lack sophisticated visual display mechanisms. Some telephones have small visual displays and some vendors offer WWW browsers targeted to these limited displays. The best example of such a browser is Unwired Planet's UP.Browser. These systems are still dependent on a visual display, however, and thus are not usable on traditional telephones which have no visual display.

The Web-On-Call system from Netphonic allows telephonic access to the WWW by providing an audio rendering of WWW documents. However, this system requires the WWW content-provider to modify, or pre-process, all of the content which they wish to make available. Such a system is called a *server-side* solution and does not enable individual WWW users to browse to arbitrary WWW sites. Users may only browse sites that have the special modifications. In order to allow arbitrary browsing, a *client-side* solution is needed, one which renders arbitrary WWW documents into audio on the fly.

The Web-Based Interactive Radio Environment: WIRE system developed by Siemens Corporate Research Inc., described in United States Patent Application Number 08/768,046, filed on December 13, 1996 and assigned to the same assignee as the present invention, offers a mechanism for rendering arbitrary WWW documents using audio. As the WIRE system offers broad rendering support for structured documents as well as audio data, it is a natural tool for building client-side, audio-only, WWW browsers.

Summary of the Invention

The present invention is a system which employs the WIRE system and other components to allow browsing the WWW with a traditional telephone. The system also enables access to e-mail. This system works on the client-side, and thus requires no special preparation by the WWW content-provider. It uses only audio to render WWW documents and thus requires no visual display.

The traditional telephone is utilized to contact a host computer which has a voice-capable modem, a telephone-driven audio WWW browser (TAWB) and a

connection to the Internet, called a network interface. The TAWB comprises a telephony interface, a digital voice processing module (DVP), an interchange between the telephony interface and the DVP, an audio document renderer, a command and control module, and an Internet interface. Additionally, the system contains a friendly server for storing information. Finally, the system relies on the presence of the WWW which can be described as a collection of WWW servers connected to the Internet, an Intranet or an Extranet.

Brief Description of the Drawings

Figure 1 illustrates a block diagram of the present invention.

Figure 2 illustrates an overview of a telephone-driven audio WWW browser of the present invention.

Figure 3 illustrates a block diagram of the command and control module of the present invention.

Figure 4 illustrates an example of a touch-tone to user command map of the present invention.

Figure 5 illustrates the high level operation of the command and control logic of the present invention.

Figure 6 illustrates a block diagram of the main loop of the command and control logic of the present invention.

Figure 7 illustrates a block diagram of the digital voice processing module of the present invention.

Figure 8 illustrates a block diagram of the friendly server of the present invention.

Figure 9 illustrates an example of a CGI program.

Detailed Description of the Invention

Figure 1 shows the high-level architecture of the present invention. The user of the system must have a telephone handset 10 that has touch-tone capability. There are no other requirements placed on the telephone handset 10. Notably, the telephone handset 10 may be a mobile telephone, such as a cellular telephone. To utilize the system, the user dials into a host computer system 12. This host computer system 12 has a voice-capable modem 14, a telephone-driven audio WWW browser (TAWB) 16, and a connection to the Internet, called a network interface 18. (Throughout this specification, it should be understood that the term "Internet" could be readily replaced by "Intranet" or "Extranet" with minimal additional changes to the rest of the specification). Typical network interfaces are Ethernet cards or modems. Additionally, the system contains a friendly server 20 for storing information. Finally, the system relies on the presence of the WWW, which can be described as a collection of WWW servers 22 connected to the Internet.

At a high level, the system works in the following manner. The user employs his telephone handset to dial into the host computer. The host computer's voice modem accepts the call and acts as an interface between the TAWB and the public telephone network. The user then issues commands consisting of telephone touch-tones, spoken voice commands, or both. The TAWB interprets these commands, downloads the appropriate WWW documents from the Internet and renders them to an audio stream.

Telephone Driven
Audio WWW-Browser

The TAWB sends the audio stream, via the public telephone network, to the telephone handset where the user listens to it. As the user listens, he or she may issue additional commands which the TAWB will capture and interpret. For example, the system allows hyperlinks to be followed, skips to be made forward and backward through the current document, and pauses in the rendering.

The following will describe the Telephone-driven Audio World Wide Web Browser (TAWB) 16. Figure 2 shows a block diagram of the TAWB 16. In consists of a telephony interface 23, a digital voice processing module (DVP) 25, an interchange between the telephony interface and the DVP 24, an audio document renderer 26, a command and control module 27, and an Internet interface 28. The Internet interface 28 is to be distinguished from the network interface 18 shown in Figure 1 in the following manner. The Internet interface 28 provides application level network protocols such as HTTP and FTP while the network interface (18 of Figure 1) provides lower level network protocols such as TCP/IP.

An overview of the TAWB 16 follows. The command and control module (CCM) 27 directs the action of the other modules, interpreting user commands and directing the appropriate response. The Internet interface 28 provides access to WWW servers, from where WWW documents are obtained and access to the friendly server. The audio document renderer 26 converts structured documents from the WWW into an audio rendition. This rendition includes audio signals sent directly to the telephony interface 23, but consists primarily of a specially prepared structured text stream that is sent to the digital voice processing module (DVP) 25. The DVP module 25 converts the text stream to an audio "voice" stream and sends this to the telephony interface 23 by way of the DVP/telephony

interchange 24. The DVP 25 also converts voice commands received from the telephony interface 23 by way of the DVP/telephony interchange 24 into commands that are passed to the CCM 27. The DVP/telephony interchange 24 is necessary to convert between the dissimilar formats used by the DVP module 25 and the telephony interface 23. The telephony interface 23 captures and delivers audio streams and touch-tones to and from the public telephone network.

The following will describe the TAWB 16 of the present invention in more detail. The Internet interface 28 is responsible for providing application level network services to the CCM 27. Specifically, the Internet interface 28 must provide the following well known services. Hypertext Transfer Protocol (HTTP): This serves to download WWW documents from remote WWW servers and also to upload information back to the servers under some circumstances. Post Office Protocol (POP): This serves to download e-mail documents from remote WWW servers. File Transfer Protocol (FTP): This serves to transfer files to and from the friendly server. The Internet interface 28 takes its direction from the CCM 27 as described below. It returns all documents which it downloads to the CCM 27.

The CCM 27 directs the operation of the TAWB system 16. A block diagram of the CCM 27 is shown in Figure 3. Within the CCM 27, the touch-tone to user-command map (TTUCM) 30 accepts touch-tone digits from the telephony interface and determines which user command they represent. As commands may consist of varying numbers of tones, the TTUCM 30 constitutes a finite-state machine in which receiving a touch-tone acts to move the machine along an edge. Many TTUCMs are possible, depending on the set of commands which the TAWB is to support.

An example of a TTUCM 30 is shown in Figure 4. To reduce complexity, not all possible commands are shown. A complete TTUCM would be more complex but would follow the same principles. In Figure 4, if the first touch-tone is a 1, 2 or 3, the TTUCM decides that the command is "Follow", "Skip Back", or "Skip Ahead", respectively. If the first touch tone is 0, #, or *, the TTUCM accepts the next touch-tone and then uses this second tone as an index for either the "Get Favorite", "Set Favorite" or "Select from History List" commands, respectively.

The local flags cache 32 is a data-store that keeps a local copy of the addresses of documents that the user has flagged. The purpose of the flagging process is described below. The local favorites cache 34 is a data-store that keeps a local copy of the addresses of the user's favorite WWW documents. The history list 36 is a data-store which stores addresses of pages recently visited by the user, in the manner directed by the command and control logic 38. It contains a position pointer which marks one address as the current address.

The command and control logic (CCL) 38 directs the operations of the CCM. Figure 5 shows the high-level operation of the CCL 38. Upon activation, the CCL 38 through the wait state module 50 is in a wait state. It waits for notification from the telephony interface that a call has been received and a connection established with a user. Next, the CCL directs the Internet interface to retrieve the user's favorites from the friendly server through the Internet interface retrieval director 52. These favorites are then stored in the local favorites cache. Next, the CCL through the command and control enter module 54 enters the command and control main loop, which is described in detail below. Upon receiving a quit command from the user via the TTUCM, the CCL directs the telephony interface to

terminate the telephone connection. This is performed in the telephony interface termination director 56. Next, the CCL directs the Internet interface to take the user favorites in the local favorites cache and store them on the friendly server. This is performed in the Internet interface store favorites director 58. Finally, the CCL, through the Internet interface store user flags director 60, directs the Internet interface to store the user flags from the local flags cache to the friendly server.

The following will describe the Command and Control Main Loop. The main loop of the command and control logic is the normal operating logic for the TAWB system while it is in use. Figure 6 shows a block diagram of the main loop. At a high level, the loop consists of two actions repeated continuously: first get a command, then execute that command. Commands come either from the touch-tone to user-command map (TTUCM) 62 or from the voice to user-command map (VUCM) 64 of the DVP module (25 of Figure 2). Note that while either a TTUCM or VUCM is required, and both are desirable, only one is necessary for the system to function. A working TAWB system can be made with TTUCM only, VUCM only, or both.

The main loop acts asynchronously from the rest of the modules. This means that once the "wait for user command" 65 state is reached, new commands may be accepted and processed even if other modules have not finished their last assigned task. Notably, this means that the user may interrupt the rendering of a document with new commands, thus allowing a high degree of interactivity.

There are a large number of potential user-level commands which may be offered by the TAWB system. These commands are those of a traditional WWW browser and are well known. There are additionally some commands which

are new and relevant in telephone-based browsers. The following will describe examples of the most critical set of commands. The scope of the present invention is not limited to the specific set of commands described but includes any reasonable set of commands and the new commands described.

After receiving a command, the CCL determines which command it is 66. The following describes the handling of a set of relevant commands. In the discussion that follows, the term "URL" refers to the Uniform Resource Locator, which is an addressing standard used on the WWW.

Skip Ahead, Skip Back or Restart. In the case of one of these commands, the CCM directs 67 the audio document renderer to adjust its rendering accordingly.

Reset Favorite *N*. The CCM stores 68 the current URL in the local favorite cache at index *N*. This process overwrites the previous contents of index *N* in the local favorites cache.

Follow Link. The CCM gets 69 the URL of the current *active link* from the audio document renderer, directs 70 the Internet interface to retrieve the document stored at that URL, directs 71 the audio document renderer to render this document, and updates 72 the history list by adding the URL above the current position pointer and advancing the position pointer.

Load Favorite *N*. The CCM lookups 73 the URL stored in the local favorites cache at index *N*, directs 70 the Internet interface to retrieve the document stored at that URL, directs 71 the audio document renderer to render this document, and updates 72 the history list by adding the URL above the current position pointer and advancing the position pointer.

Back Or Forward. The CCM gets 74 the appropriate hyperlink from the history list, directs 70 the Internet

interface to retrieve the document stored at that URL, directs 71 the audio document renderer to render this document, and updates 72 the history list by advancing or retreating the position pointer as appropriate.

Flag Current Page. The CCM gets 75 the URL of the current document from the history list and stores it in the local flags cache.

Quit. The main loop of the CCL terminates. The CCL then continues as specified in Figure 5.

An essential element of the TAWB is the *audio document renderer*(ADR). The ADR is responsible for taking a WWW document and creating an audio rendition. Some types of documents, are primarily audio in nature and these may be rendered directly. For example, RealAudio streams, waveform audio data, and structured audio data like MIDI, can all be rendered directly. For documents of these types, the ADR can send the rendered output directly to the telephony interface.

Most WWW documents, however, are not inherently audible in nature. Two significant examples are e-mail messages and HTML documents which are composed of structured text. To convert documents such as these into audio requires a tool such as the WIRE system (described in US Patent Application Serial Number 08/768,046). WIRE accepts a structured document and outputs a text stream suitable for rendering by the text-to-speech synthesizer (TTS) component of the DVP. WIRE converts abstract, semantic mark-up into the literal, syntactic mark-up needed to convey the abstractions using audio and in a form which can be interpreted by a TTS.

The text stream produced by the ADR is sent to the TTS component of the DVP. This text stream is not necessarily linear, or ordered in the same way as the original WWW document, but instead the ADR may be directed by the CCM to send arbitrary parts of the

document to the TTS. The CCM determines which part of the document to send based on the "navigation" commands sent by the user, such as "Skip Ahead" or "Skip Back". Systems such as WIRE may offer other "rendering modes" in which certain parts of a document are summarized or skipped based on the user's preferences.

An additional requirement is that the ADR must provide the CCM with the "active link" when requested. This is the hyperlink corresponding to the anchor most recently rendered.

The digital voice processing module (DVP) (25 of Figure 2) consists of two components as shown in Figure 7. The text-to-speech synthesizer (TTS)78 accepts marked up text from the ADR and generates waveform audio which is sent to the DVP/telephony interchange. The voice recognizer component 79 accepts waveform audio from the DVP/telephony interchange and sends user command strings to the CCM. In a prototype system, Microsoft Speech API (SAPI) was used as the interface through which the ADR and CCM modules could direct the operation of the DVP. Using the SAPI interface, there are many commercial packages available which can serve the role of the text-to-speech synthesizer, such as Lernout & Houspie's TruVoice, and of the voice recognizer, such as AT&T's Watson.

The following will describe the DVP/Telephony Interchange (24 of Figure 2). Many commercial DVP packages produce or consume audio data in a different format than can be accepted by computer telephony interfaces. The job of the DVP/telephony interchange is to convert audio data from one format to another so that these two TAWB components can share the data. Since the audio is in the form of real-time streams, the format conversion must be fast and must be done on the fly. For example, if the sampling rate produced by the TTS engine

is diferent than that accepted by the telephony interface, the interchange must make the conversion. A suitable system is described in US Patent Application Serial Number ##########, entitled "A Real-Time Down-Sampling System For Digital Audio Waveform Data", assigned to the same assignee as the present invention, filed concurrently with this application and incorporated herein by reference.

The following will describe the telephony interface (23 of Figure 20). A TAWB PC needs an interface to the public telephone system. This interface essentially must allow the computer to control the modem which acts as the local telephony client. Specifically, the interface must be able to send and receive waveform audio and touch-tones and deliver them to both the TAWB system and the public telephony network in an understandable form. In practice, many commercial modems provide software drivers which conform to Microsoft's Telephony API (TAPI). Since the TAPI definition includes all of the services that the TAWB requires, these software drivers may serve the role of the telephony interface.

Although an audio-only WWW browser can be extremely useful under many circumstances, it is clear that many users will continue to use their visually based browsers in circumstances which permit it. Therefore, it is convenient to support the sharing of information between the two types of browsers. The friendly server (20 of Figure 1) is a repository for information that is accessible by any WWW-enabled device, including TAWB browsers and visual browsers. As some kinds of information are difficult to comprehend in an audio-only environment, the ability to share addresses with a visual browser can be seen as a required feature of an audio-only browser.

Figure 8 shows a block diagram of the friendly server 20. The user favorites store 82 is a persistent data repository for addresses of the user's favorite documents, that is, the documents he or she has chosen to associate with preset commands in the TAWB browser. The purpose of the user's favorites is to allow the user to access certain sites quickly with a minimum of browsing. The Internet interface for TAWB browser 84 allows the TAWB system to upload replacement favorites which may have been set by the user while using the TAWB system. This interface is simply an FTP server as is known in the art. The Internet interface for traditional browser 86 allows the user to modify his or her favorites while using a traditional WWW browser. This interface consists of a CGI program within which the user can modify the favorites store and an HTTP server as is known in the art which allows the browser to access the CGI program. An example of a suitable CGI program is shown in Figure 9. This program allows the user to modify the values of the favorites by typing new URL's in the boxes. Pressing the update button completes the modification. In this way, the user may easily transfer documents found with a traditional browser to his or her TAWB browser.

The user flags store 88 is a persistent data repository for the user's flagged URLs. The purpose of the flags is to make documents found with the TAWB browser available to a traditional browser. The Internet interface for TAWB browser 84 allows the TAWB system to upload addresses of documents which have been flagged by the user while using the TAWB system. This interface is simply an FTP server as is known in the art. The addresses are stored in the form of a WWW document containing hyperlinks to the flagged documents. The Internet interface for traditional browser 86 allows the user to view this document and follow the hyperlinks with

a traditional browser. This interface is simply an HTTP server as is known in the art.

In summary, the present invention is a system which allows a user with an ordinary telephone to browse the World Wide Web. The present invention is an improvement over prior art systems because any WWW documents can be obtained, not just documents that were specially prepared for audio access. The present invention works with a traditional telephone and does not require the phone to have a visual display or special internal electronics. The present invention is particularly valuable to people who need mobile access, are visually impaired, cannot afford browsers which require special hardware, or who work in environments where visual displays are not practical.

It is not intended that this invention be limited to the hardware or software arrangement, or operational procedures shown disclosed. This invention includes all of the alterations and variations thereto as encompassed within the scope of the claims as follows.

CLAIMS:

1. A system for browsing the world wide web with a traditional telephone comprising:

a host computer system capable of connecting to a telephone network and Internet, wherein said host computer system comprises:

a voice modem;

a telephone-driven audio WWW browser (TAWB) connected to said voice modem; and

a network interface connected to said telephone-driven audio WWW browser.

2. A system for browsing the world wide web with a traditional telephone as claimed in claim 1 wherein said telephone-driven audio WWW browser comprises:

a telephony interface;

a DVP/telephony interchange connected to said telephony interface;

a digital voice processing unit connected to said DVP/telephony interchange;

an audio document renderer connected to said digital voice processing unit;

a command and control module connected to said audio document renderer; and

an internet interface connected to said command and control module.

3. A system for browsing the world wide web with a traditional telephone as claimed in claim 2 wherein said digital voice processing unit comprises:

a text-to-speech synthesizer;

4. A system for browsing the world wide web with a traditional telephone as claimed in claim 3 wherein said digital voice processing unit further comprises:

a voice recognizer component;

wherein said digital voice processing unit converts voice commands received from said telephony interface by way of said DVP/telephony interchange into commands that are passed to said command and control module.

5. A system for browsing the world wide web with a traditional telephone as claimed in claim 2 wherein said command and control module comprises:

a touch-tone to user-command map;

command and control logic;

a local flags cache;

a local favorites cache; and

a history list module.

6. A system for browsing the world wide web with a traditional telephone as claimed in claim 5 wherein said command and control logic comprises:

a wait state module;

an internet interface retrieval director;

a command and control enter module;

a telephony interface termination director;

an internet interface store favorites director; and

an internet interface store user flags director.

7. A system for browsing the world wide web with a traditional telephone as claimed in claim 6 wherein said command and control enter module comprises:

a voice to user-command map;

a touch-tone to user-command map;

a user-command wait module; and

command decision module.

8. A system for browsing the world wide web with a traditional telephone as claimed in claim 1 further comprising:

a friendly server for storing information.

9. A system for browsing the world wide web with a traditional telephone as claimed in claim 8 wherein said friendly server comprises:

an internet interface for said telephone-driven audio WWW browser;

an internet interface for a traditional browser;

a user favorites store; and

a user flags store.

10. A system for browsing the world wide web with a traditional telephone as claimed in claim 1 wherein said telephone-driven audio WWW browser comprises:

telephony interface means for capturing and delivering audio streams and touch tones to and from said telephone network;

DVP/telephony interchange means for converting between dissimilar formats used by said telephony interface means;

digital voice processing means for converting a text stream to an audio voice stream and for sending said audio voice stream to said telephony interface means by way of said DVP/telephony interchange means;

audio document renderer means for converting structured documents from said world wide web into an audio rendition;

command and control module means for interpreting user commands and for directing an appropriate response; and

internet interface means for providing access to WWW servers.

11. A system for browsing the world wide web with a traditional telephone as claimed in claim 10 wherein said audio rendition comprises:

audio signals sent directly to said telephony interface means.

12. A system for browsing the world wide web with a traditional telephone as claimed in claim 10 wherein said audio rendition comprises:

a specially prepared structured stream that is sent to said digital voice processing means.

13. A method for browsing the world wide web with a traditional telephone comprising the steps of:

utilizing a host computer system connected to a telephone network and Internet; wherein utilizing a host computer system comprises the steps of:

communicating through a voice modem from said telephone network;

utilizing a telephone-driven audio WWW browser (TAWB) connected to said voice modem; and

using a network interface between said Internet and said telephone-driven audio WWW browser.

14. A method for browsing the world wide web with a traditional telephone as claimed in claim 13 wherein

utilizing a telephone-driven audio WWW browser comprises the steps of:

using a telephony interface;

using a digital voice processing unit;

interfacing said telephony interface and said digital voice processing unit with a DVP/telephony interchange;

utilizing an audio document renderer connected to said digital voice processing unit;

utilizing a command and control module connected to said audio document renderer; and

using an internet interface connected to said command and control module.

15. A method for browsing the world wide web with a traditional telephone as claimed in claim 14 wherein using a digital voice processing unit comprises the step of:

performing text-to-speech synthesizing.

16. A method for browsing the world wide web with a traditional telephone as claimed in claim 15 wherein using a digital voice processing unit further comprises the step of:

recognizing a voice component.

17. A method for browsing the world wide web with a traditional telephone as claimed in claim 14 wherein utilizing a command and control module comprises the steps of:

converting a touch-tone to user-commands;

utilizing command and control logic;

utilizing a local flags cache;

utilizing a local favorites cache; and

accessing a history list module.

18. A method for browsing the world wide web with a traditional telephone as claimed in claim 17 wherein utilizing command and control logic comprises the steps of:

entering a wait state;

directing said internet interface to retrieve a user's favorites from a friendly server;

entering a command and control main loop;

directing said telephony interface to terminate connection;

directing said internet interface to store favorites; and

directing said internet interface to store user flags.

19. A method for browsing the world wide web with a traditional telephone as claimed in claim 18 wherein entering a command and control main loop comprises the steps of:

converting voice to user-commands;

converting touch-tone to user-commands;

waiting for a user-command; and

deciding which user command.

20. A method for browsing the world wide web with a traditional telephone as claimed in claim 13 further comprising the step of:

storing information in a friendly server.

21. A method for browsing the world wide web with a traditional telephone as claimed in claim 20 wherein storing information comprises the steps of:

interfacing said friendly server with said telephone-driven audio WWW browser;

interfacing said friendly server with a traditional browser;

storing user favorites; and

storing user flags.

22. A method for browsing the world wide web with a traditional telephone as claimed in claim 13 wherein utilizing said telephone-driven audio WWW browser comprises the steps of:

capturing and delivering audio streams and touch tones to and from said telephone network with a telephony interface;

converting between dissimilar formats used by said telephony interface means with a DVP/telephony interchange;

converting a text stream to an audio voice stream and sending said audio voice stream to said telephony interface by way of said DVP/telephony interchange with a digital voice processing unit;

converting structured documents from said world wide web into an audio rendition with an audio document renderer;

interpreting user commands and directing an appropriate response with a command and control module; and

providing access to WWW servers with an internet interface.

23. A system for browsing the world wide web with a traditional telephone comprising:

a computer system capable of connecting to a telephone network and Internet; and

a friendly server for exchanging information between a telephone based browser and a visual based browser.

24. A system for browsing the world wide web with a traditional telephone as claimed in claim 23 wherein said friendly server comprises:

an internet interface for a telephone-driven audio WWW browser;

an internet interface for a traditional browser;
a user favorites store; and
a user flags store.

25. A system for exchanging information between a telephone based browser and a visual based browser comprising:
a computer system capable of connecting to a telephone network and Internet; and
a friendly server connected to said computer system.

26. A system for exchanging information between a telephone based browser and a visual based browser as claimed in claim 25 wherein said friendly server comprises:
an internet interface for a telephone-driven audio WWW browser;
an internet interface for a traditional browser;
a user favorites store; and
a user flags store.

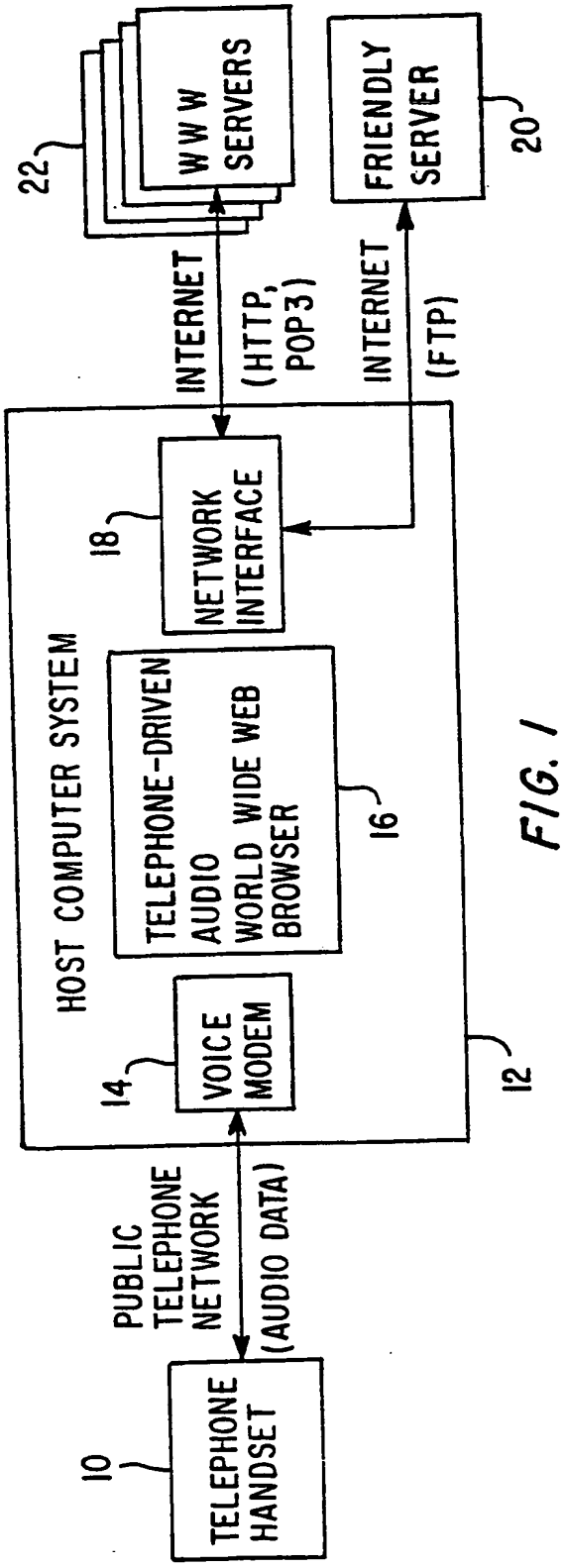
WWW SERVERS
22
FRIENDLY SERVER
20
INTERNET (HTTP, POP3)
INTERNET (FTP)
NETWORK INTERFACE
18
HOST COMPUTER SYSTEM
TELEPHONE-DRIVEN AUDIO WORLD WIDE WEB BROWSER
16
VOICE MODEM
14
12
PUBLIC TELEPHONE NETWORK (AUDIO DATA)
TELEPHONE HANDSET
10

FIG. 1

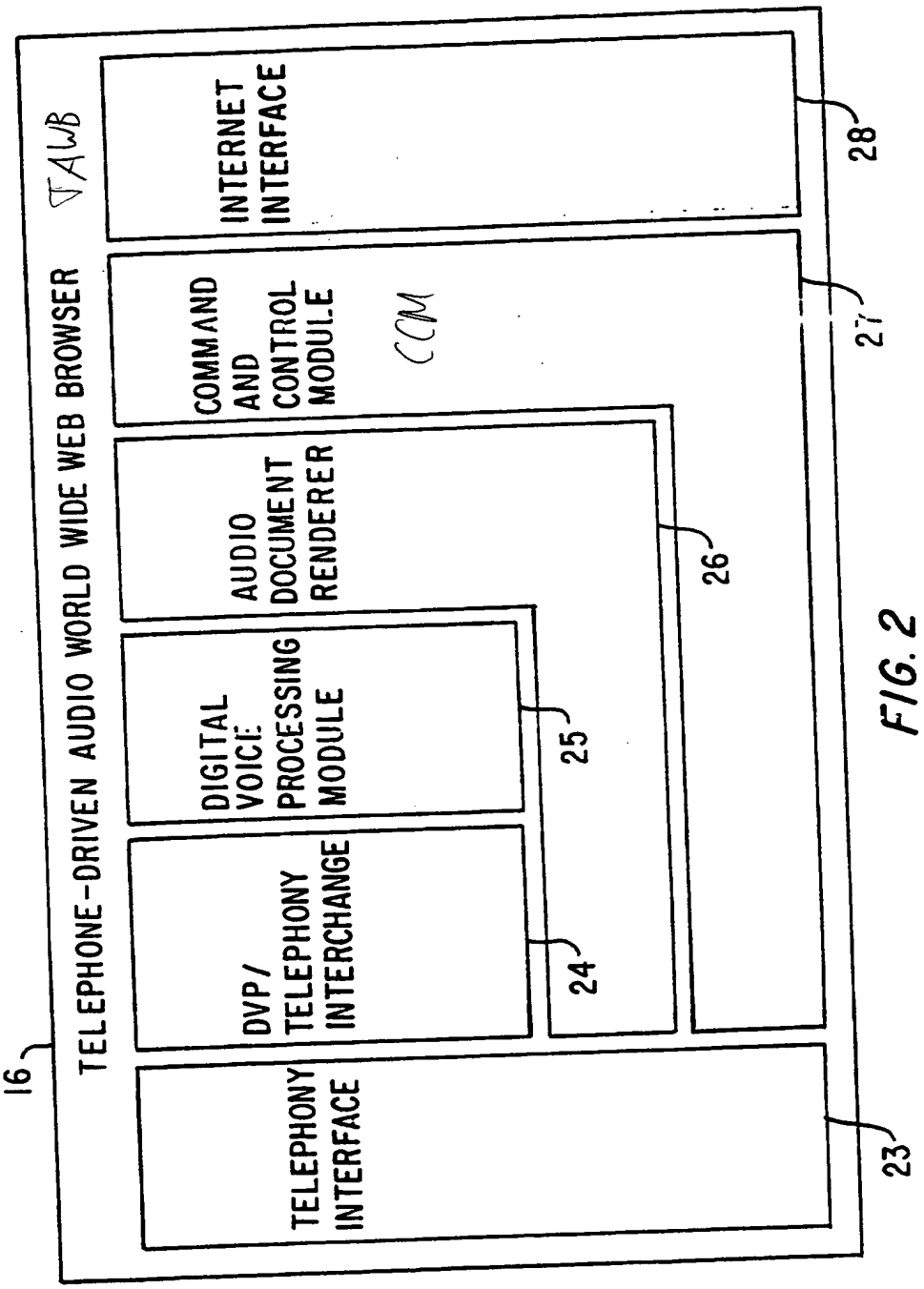
TELEPHONE-DRIVEN AUDIO WORLD WIDE WEB BROWSER
16
TELEPHONY INTERFACE
23
DVP / TELEPHONY INTERCHANGE
24
DIGITAL VOICE PROCESSING MODULE
25
AUDIO DOCUMENT RENDERER
26
COMMAND AND CONTROL MODULE
27
INTERNET INTERFACE
28

FIG. 2

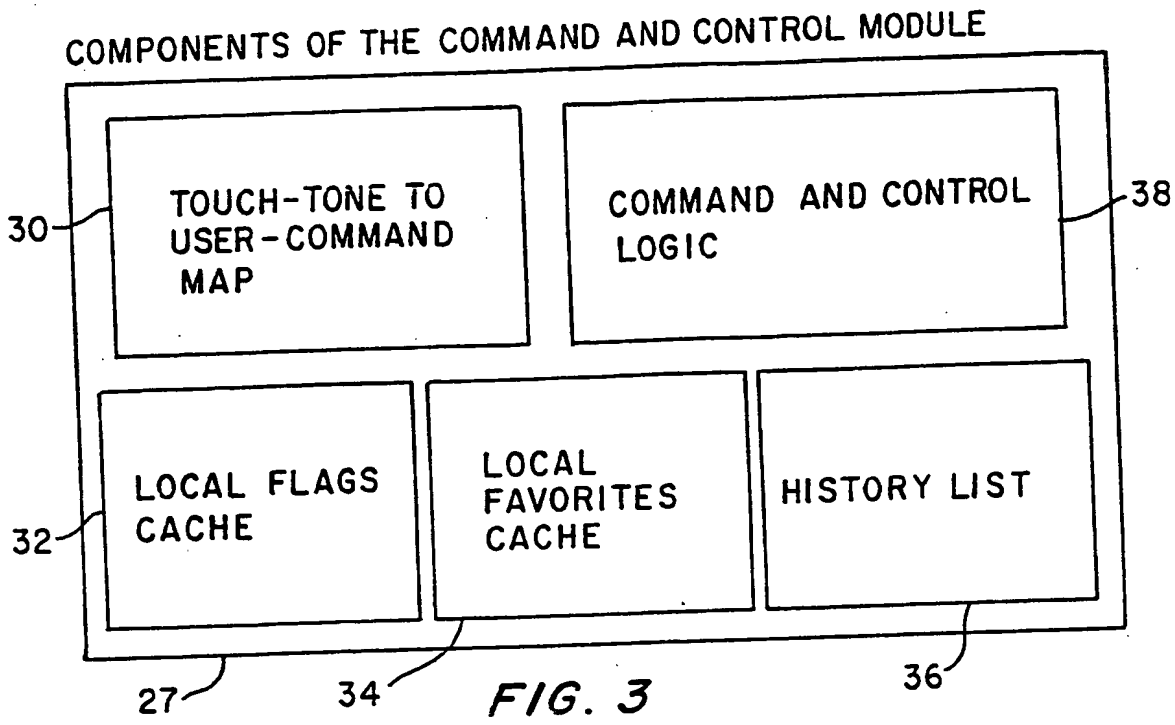
COMPONENTS OF THE COMMAND AND CONTROL MODULE
TOUCH-TONE TO USER-COMMAND MAP
30
COMMAND AND CONTROL LOGIC
38
LOCAL FLAGS CACHE
32
LOCAL FAVORITES CACHE
HISTORY LIST
27
34
36

FIG. 3

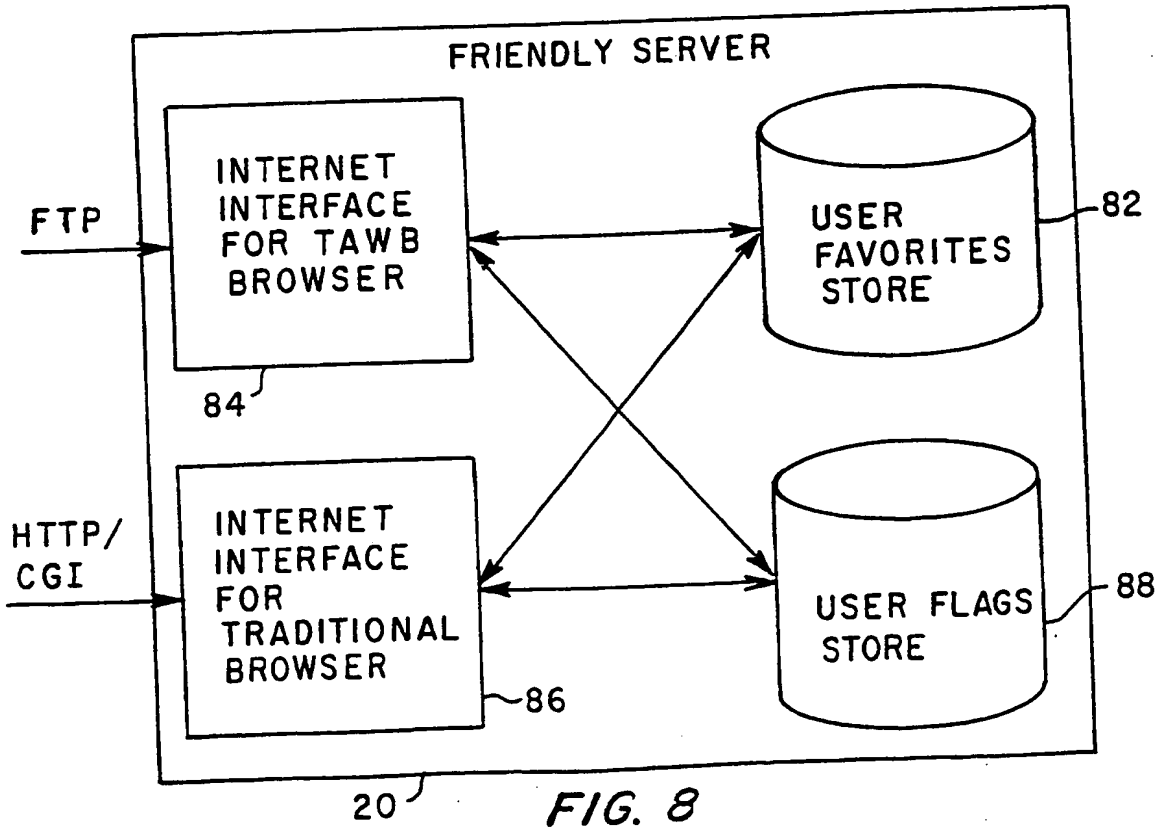
FRIENDLY SERVER
FTP
INTERNET INTERFACE FOR TAWB BROWSER
84
USER FAVORITES STORE
82
HTTP/ CGI
INTERNET INTERFACE FOR TRADITIONAL BROWSER
86
USER FLAGS STORE
88
20

FIG. 8

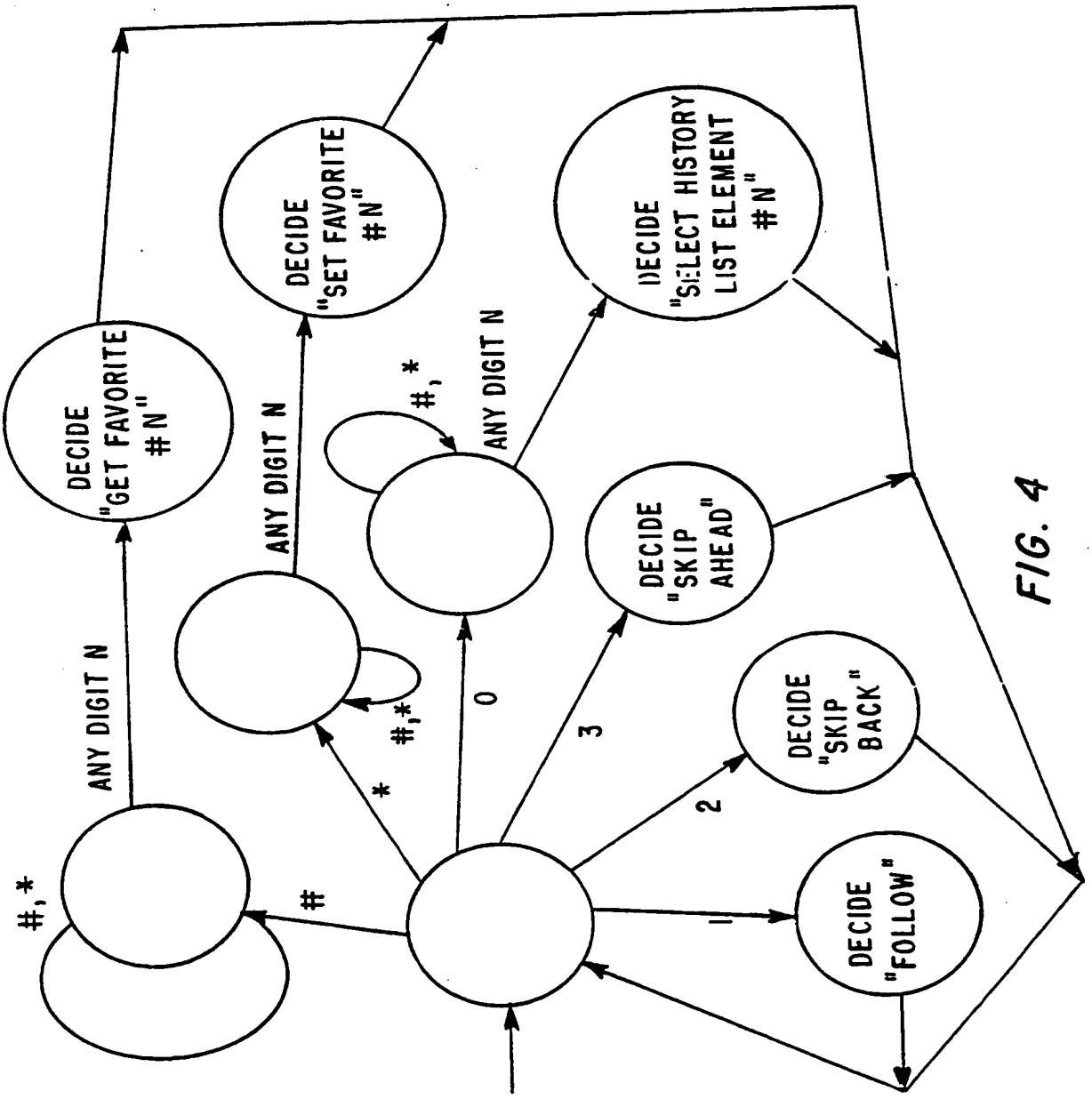
DECIDE "GET FAVORITE #N"
DECIDE "SET FAVORITE #N"
DECIDE "SELECT HISTORY LIST ELEMENT #N"
DECIDE "SKIP AHEAD"
DECIDE "SKIP BACK"
DECIDE "FOLLOW"
ANY DIGIT N
ANY DIGIT N
ANY DIGIT N
#,*
#,*
#,*
#
*
0
3
2
1

FIG. 4

OPERATION OF THE COMMAND AND CONTROL LOGIC

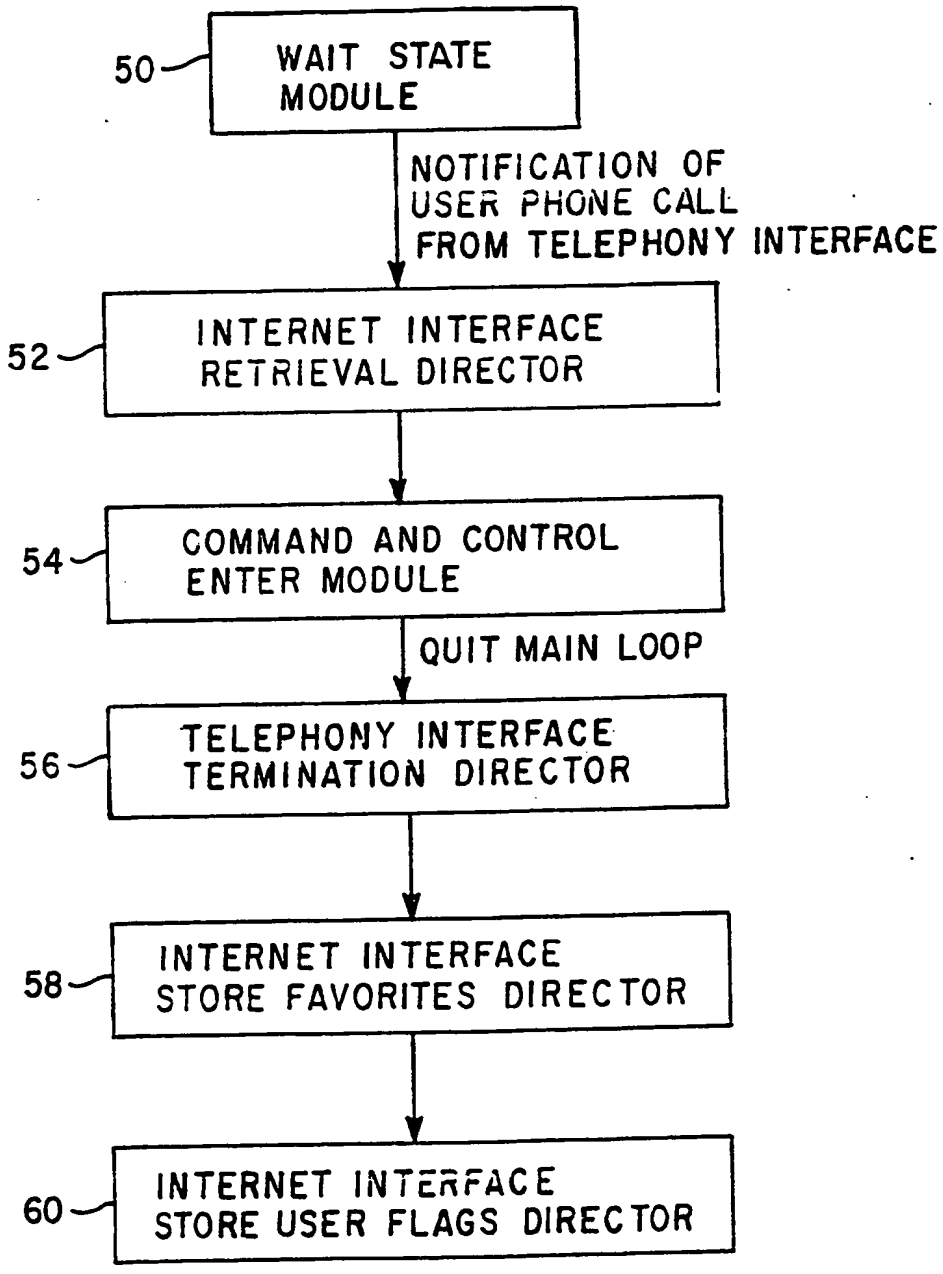

FIG. 5

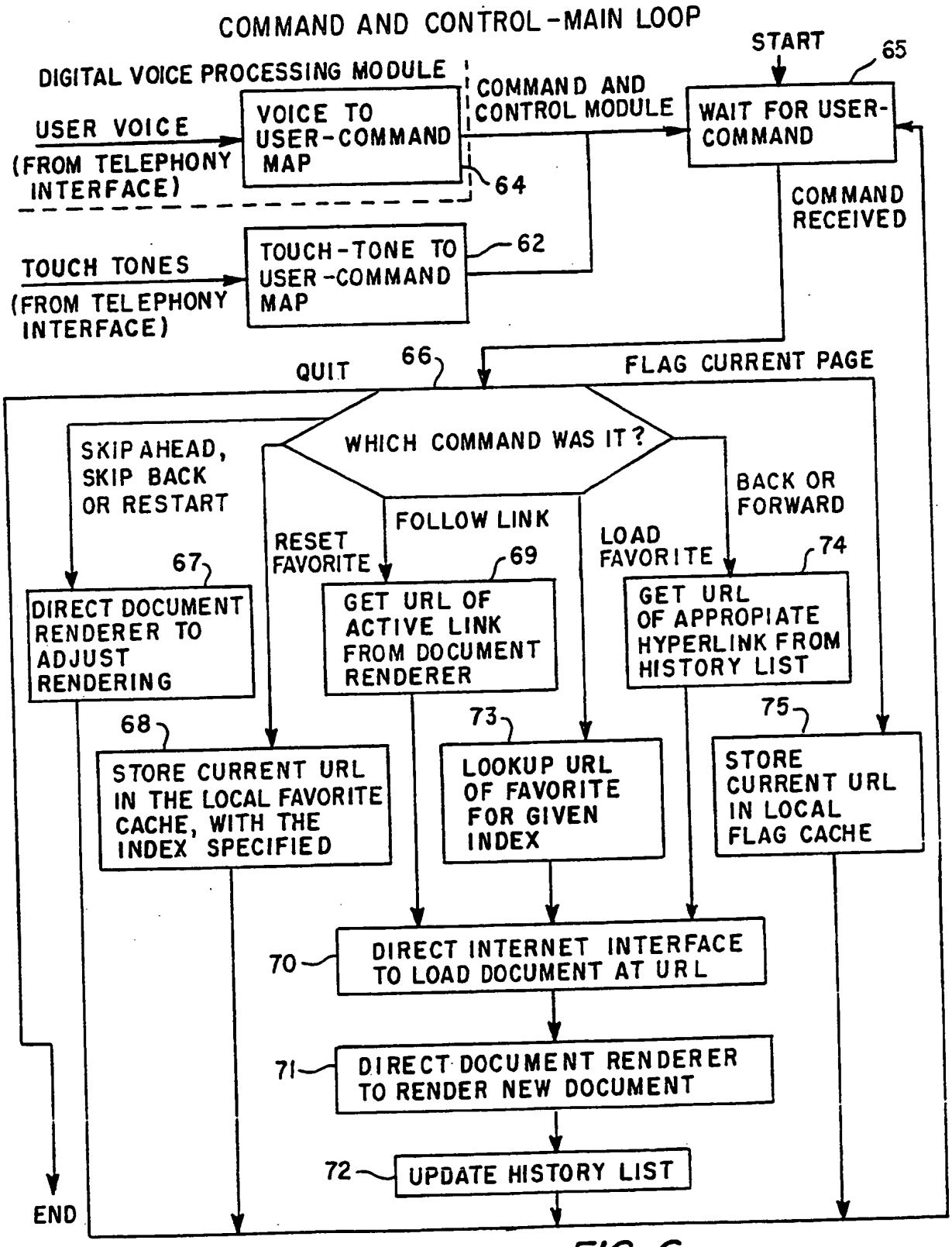
COMMAND AND CONTROL - MAIN LOOP
DIGITAL VOICE PROCESSING MODULE
COMMAND AND CONTROL MODULE
START
65
USER VOICE
(FROM TELEPHONY INTERFACE)
VOICE TO USER-COMMAND MAP
64
WAIT FOR USER-COMMAND
COMMAND RECEIVED
TOUCH TONES
(FROM TELEPHONY INTERFACE)
TOUCH-TONE TO USER-COMMAND MAP
62
QUIT
66
FLAG CURRENT PAGE
WHICH COMMAND WAS IT?
SKIP AHEAD, SKIP BACK OR RESTART
RESET FAVORITE
FOLLOW LINK
LOAD FAVORITE
BACK OR FORWARD
67
69
74
DIRECT DOCUMENT RENDERER TO ADJUST RENDERING
GET URL OF ACTIVE LINK FROM DOCUMENT RENDERER
GET URL OF APPROPIATE HYPERLINK FROM HISTORY LIST
68
73
75
STORE CURRENT URL IN THE LOCAL FAVORITE CACHE, WITH THE INDEX SPECIFIED
LOOKUP URL OF FAVORITE FOR GIVEN INDEX
STORE CURRENT URL IN LOCAL FLAG CACHE
70
DIRECT INTERNET INTERFACE TO LOAD DOCUMENT AT URL
71
DIRECT DOCUMENT RENDERER TO RENDER NEW DOCUMENT
72
UPDATE HISTORY LIST
END

FIG. 6

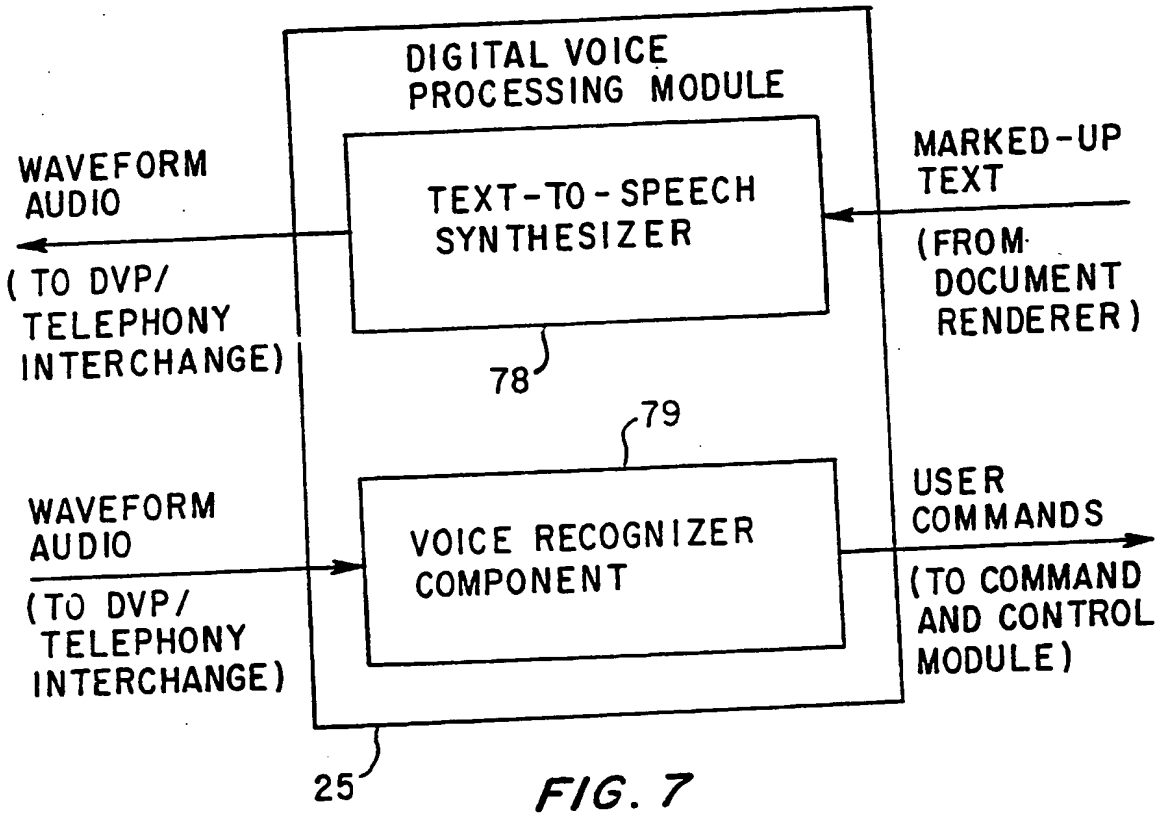
DIGITAL VOICE PROCESSING MODULE
TEXT-TO-SPEECH SYNTHESIZER
78
79
VOICE RECOGNIZER COMPONENT
25
WAVEFORM AUDIO
(TO DVP/ TELEPHONY INTERCHANGE)
MARKED-UP TEXT
(FROM DOCUMENT RENDERER)
WAVEFORM AUDIO
(TO DVP/ TELEPHONY INTERCHANGE)
USER COMMANDS
(TO COMMAND AND CONTROL MODULE)

FIG. 7

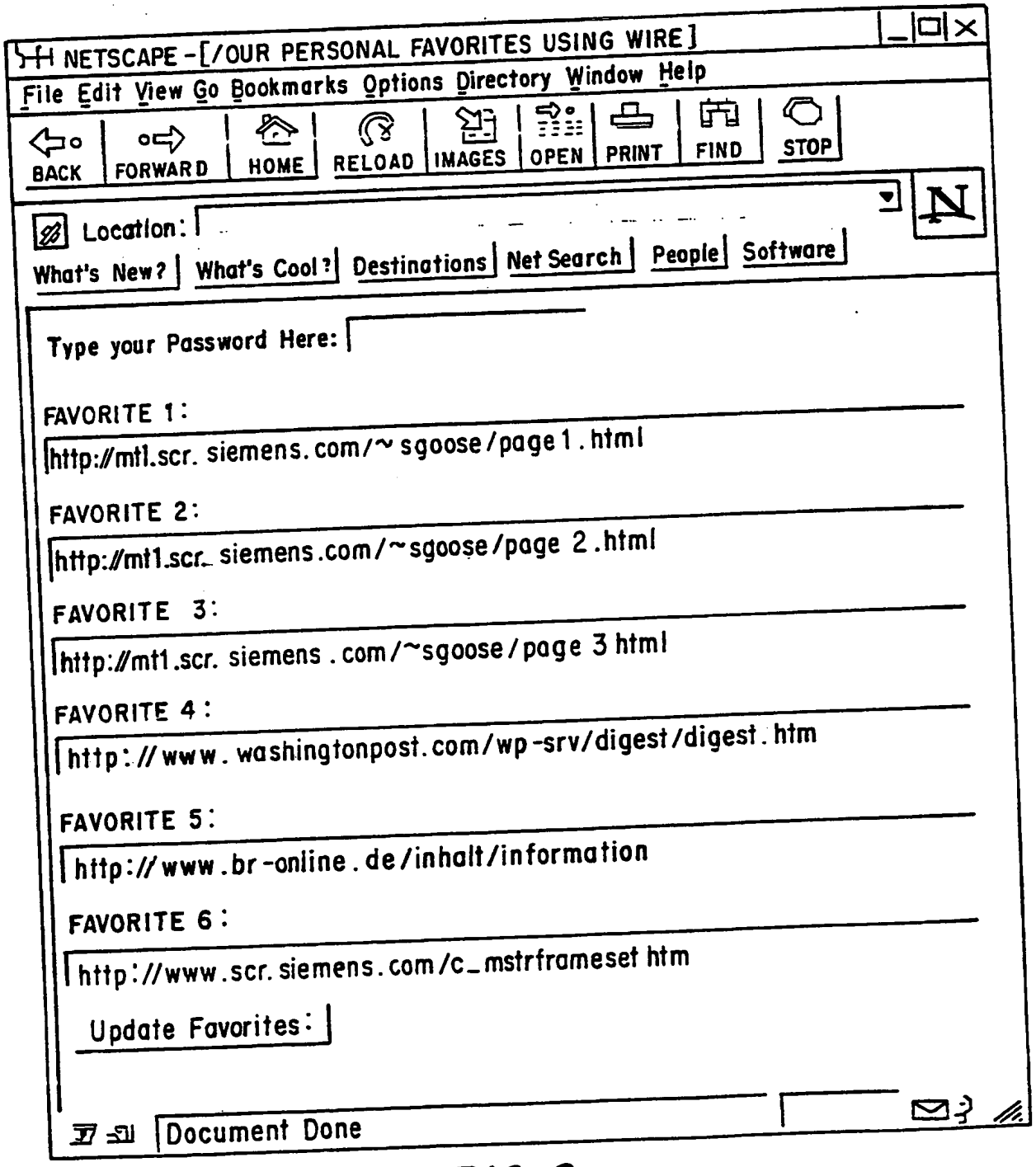
NETSCAPE -[/OUR PERSONAL FAVORITES USING WIRE]
File Edit View Go Bookmarks Options Directory Window Help
BACK
FORWARD
HOME
RELOAD
IMAGES
OPEN
PRINT
FIND
STOP
Location:
What's New?
What's Cool?
Destinations
Net Search
People
Software
Type your Password Here:
FAVORITE 1:
http://mt1.scr. siemens.com/~sgoose/page1.html
FAVORITE 2:
http://mt1.scr. siemens.com/~sgoose/page 2.html
FAVORITE 3:
http://mt1.scr. siemens .com/~sgoose/page 3 html
FAVORITE 4:
http://www.washingtonpost.com/wp-srv/digest/digest.htm
FAVORITE 5:
http://www.br-online.de/inhalt/information
FAVORITE 6:
http://www.scr.siemens.com/c_mstrframeset htm
Update Favorites:
Document Done

FIG. 9

INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/US 99/01751

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M7/00 H04M3/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M G10L G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 40611 A (AT & T CORP) 30 October 1997 see abstract; figures 1-12 see page 3, line 4 - page 4, line 7 see page 5, line 8 - page 7, line 29 see page 9, line 5 - page 11, line 11 see page 14, line 14 - page 17, line 15 see page 20, line 12 - page 24, line 4 ---	1-4, 8-16, 20-23,25
P,X	EP 0 847 179 A (AT & T CORP) 10 June 1998 see page 2, line 3 - line 44 see column 4, line 15 - column 11, line 22 --- -/--	1-4, 8-16, 20-23,25

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 May 1999	01/06/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Megalou, M

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/US 99/01751

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 307 619 A (POLLITT ALEXANDER JAMES) 28 May 1997 see the whole document	1-26
A	KITAI M ET AL: "ASR and TTS telecommunications applications in Japan" SPEECH COMMUNICATION, vol. 23, no. 1-2, 1 October 1997, page 17-30 XP004117205 see abstract see page 24, paragraph 4 - page 25, paragraph 5	1,13
A	WO 97 23973 A (IMIELINSKI TOMASZ ;VIRMANI AASHU (US); UNIV RUTGERS (US)) 3 July 1997 see abstract see page 5, line 15 - page 12, line 29	1-26
A	ATKINS D L ET AL: "INTEGRATED WEB AND TELEPHONE SERVICE CREATION" BELL LABS TECHNICAL JOURNAL, vol. 2, no. 1, 21 December 1997, pages 19-35, XP000659566 see the whole document	1-26
A	PAGE J H ET AL: "THE LAUREATE TEXT-TO-SPEECH SYSTEM - ARCHITECTURE AND APPLICATIONS" BT TECHNOLOGY JOURNAL, vol. 14, no. 1, 1 January 1996, pages 57-67, XP000554639	1-26

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern al Application No
PCT/US 99/01751

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9740611 A	30-10-1997	CA 2224712 A	30-10-1997
		EP 0834229 A	08-04-1998
EP 0847179 A	10-06-1998	CA 2213591 A	04-06-1998
		JP 10207685 A	07-08-1998
GB 2307619 A	28-05-1997	NONE	
WO 9723973 A	03-07-1997	AU 1566497 A	17-07-1997